REMARKS/ARGUMENTS

Reconsideration of the application is requested.

The claims have not been amended. It is believed that all of the claims are patentable over the prior art of record. The Examiner is respectfully urged to consider the following arguments in support of the patentability of the claims.

It is appreciatively noted that the Examiner has withdrawn the rejections based on the references Harada et al. and Kato et al.. It is further appreciatively noted that claim 80 has been indicated as being allowable over the art of record. As we believe that all of the claims of record should be allowed, we have not rewritten claim 80 in independent form.

The latest action contains two rejections under 35 U.S.C. § 102 and one rejection over a combination of several references under 35 U.S.C. § 103.

35 U.S.C. § 102(e) - Yamana et al.

First, we address the rejection of several of the claims as being anticipated by Yamana et al. under 35 U.S.C. § 102(e). The reference to Yamana et al. has an effective date of October 30, 2000. The instant application claims a priority date, under 35 U.S.C. § 119, of December 16, 1999. A certified

priority document is of record (Paper No. 22, Form PTOL-326, item 13). Enclosed herewith is a certified translation of the priority application. The claim for priority is thus perfected. Yamana et al. is not available as a prior art reference.

35 U.S.C. § 102(e) - Kanoh et al.

Next, we address the rejection of claims 45-48 and 82 as being anticipated by Kanoh et al. (US 6,255,037 B1, hereinafter "Kanoh") under 35 U.S.C. § 102(e).

We respectfully submit that Kanoh does not teach a piezo-electric device formed of a monolithic multilayer stack as claimed, nor an intermediate product in the production of a piezoelectric device as claimed.

Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 221 USPQ 385 (Fed. Cir. 1984). W.L. Gore and Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303 (Fed. Cir. 1983). In other words, a claim is anticipated if a single reference, either

expressly or inherently, discloses every limitation of the claim at issue. In re Schreiber, 128 F.3d 1473 (Fed. Cir. 1997). Furthermore, the allegedly anticipatory reference must provide an *enabling disclosure* that teaches one of ordinary skill in the art to make and/or use the invention. See, for example, Schering Corp. v. Geneva Pharmaceuticals, Inc., 348 F.3d 992, 68 USPQ2d 1760 (Fed. Cir. 2003)

Claim 47 of the instant application defines a *piezoelectric device* with a *monolithic multilayer stack of at least two piezoelectric ceramic layers and an electrode layer.* Kanoh does not disclose the claimed invention.

To be sure, the Examiner has correctly recognized that Kanoh does indeed mention "monolithic piezoelectric parts," col. 1, line 7, and "monolithic electronic parts, such as monolithic capacitors, coils, piezoelectric parts," col. 10, lines 23-24. The mere mentioning of the device in the prior art reference, however, does not suffice in the context of an anticipation rejection. It would further appear, as will be pointed out in the following, that Kanoh should not even have mentioned "piezoelectric parts" because he does in fact not provide the required teaching for forming piezoelectric parts, nor would either examples 1, 2, or 3 indeed be suitable for producing a monolithic piezoelectric part.

Kanoh does not deal in detail with a monolithic electronic component, but instead with a production process for manufacturing a monolithic electronic component. It is also important to note that the *Background of the Invention* in the reference deals with prior art methods for producing a *multi-layer capacitor*. See col. 1, lines 14 - 16. The entire disclosure of Kanoh, it turns out, indeed is limited to producing these devices. The two fleeting references to *monolithic piezoelectric parts* are thus entirely gratuitous and they do not raise to the level of detail required of an anticipatory reference. See, for example, Schering Corp., infra.

In the *Summary of the Invention* section, Kanoh discloses (and, presumptively, enables) three exemplary methods of fabricating two different multi-layer capacitors (examples 1 and 2, col. 5, line 2, or col. 6, line 48), and a monolithic coil (example 3, see col. 8, line 26).

The text passage in col. 10, lines 12 - 24, specifically cited by the Examiner then provides for additional variations of the detailed disclosure in Kanoh.

In the first paragraph, col. 10, lines 12 - 18, Kanoh discusses the use of other metals than silver and palladium, which are detailed in the exemplary embodiments. Nickel, gold, platinum, as well as copper are cited as examples.

These variations are but variations of the exemplary embodiments (they "can be . . . plated herein in the same manner," col. 10, line 16). The text, therefore, deals with two multi-layer capacitors and with a coil with different electrode materials, including *inter alia*, copper. The text clearly does not disclose a piezoelectric component.

The second paragraph, col. 10, lines 18 - 23, pertains to possible variations of the component type, with the component types described in the three exemplary embodiments forming the basis.

While Kanoh states that "the invention can generally also be used for the production of monolithic piezoelectric components," the disclosure does not enable producing a component with inner electrodes made of copper. Instead, the object of the invention is electroless plating of metals on ceramic green sheets (e.g., first embodiment of the invention, col. 2, lines 50 - 65).

In summary, Kanoh does not anticipate the invention defined in claim 47. The same holds true for claim 45 ("intermediate product in the production of a piezoelectric device") and for claim 82 ("piezoelectric device"). Kanoh does not anticipate any of the independent claims under 35 U.S.C. § 102.

35 U.S.C. § 103 - Kanoh + Seo + Tsunooka + Dawson + Horikawa

We thus turn to the obviousness rejection under 35 U.S.C. § 103, in which claims 49-79 and 81 have been rejected as being unpatentable over Kanoh in view of four (!) additional references, namely Seo (4,128,489), Tsunooka et al. (4,917,810), Dawson et al. (5,122,433), and Horikawa (6,080,328).

Kanoh fails as a primary reference in the combination for the same reasons as discussed above. Even if, arguendo, Kanoh were a proper primary reference under § 103, the combination would in no way lead to the claimed invention.

The reference pertains to the production of monolithic electrical components with very small outer dimensions. Col. 2, lines 46 - 47. The essential issues in Kanoh have to do with the production of electrically conducting thin films with a homogenously small layer thickness and with the precise structuring of the film. Col. 2, lines 43 - 46.

In order to solve these objects, there is disclosed a method for the electroless deposition of a metal. Initially, a layer of a palladium catalyst is produced, and the metal is subsequently deposited with electroless deposition by dipping in a corresponding solution.

The Kanoh process may surely be suitable to solve the posed objects. However, the electroless deposition of metals - especially in view of the claimed piezoelectric monolith - also has two major disadvantages:

(1) A catalyst layer is necessary in Kanoh's method in order to render electroless plating which renders the electroless plating possible in the first place and which contains the relatively expensive material palladium (see, for example, col. 6, lines 26 - 27). In light of the fact that Kanoh does not describe an alternative to the expensive palladium, we must assume that palladium is absolutely necessary for carrying out the process.

According to examples 1, 2, and 3, which are described in detail in Kanoh, the subsequently separated layer also contains the expensive metals silver and palladium (col. 6, lines 25 - 30; col. 8, lines 6 - 12; col. 9, lines 26 -

31). The alternatives mentioned in passing in col. 10, lines 14 - 18, including nickel, copper, gold, and platinum, relate to the electro-conductive film, not to the catalyst layer.

As illustrated in the figures, the catalyst layers 4, 14, 24 are thicker than the conductive film 5, 15, 25. In an apparent contradiction, col. 6, lines 42 - 43 states the opposite. Importantly, however, the layers thicknesses are approximately of the same magnitude. This means that the Kanoh devices would be very expensive, even if copper is used for the electroless plating, because a major portion of the entire layer thickness is coated with the expensive metal palladium.

That is, the disclosure of Kanoh deals with electrode layers formed of expensive materials.

2) The mechanical connection of the electrode layers applied by electroless plating is very low.

The adhesion between the deposited metal and the underlying green sheet is effected exclusively via the catalyst layer. Kanoh describes in col. 5, lines 63 - 67 that the catalyst layer is present as hydrophilic liquid

which is rolled or sprayed on and subsequently dried. The disclosed application of the liquid shows that no particular attention is paid to the requirements for a rigid connection and thus only a slight adhesion can be assumed.

Furthermore, Kanoh states by express teaching that a close connection between the catalyst layer and the green sheet is not desired. According to col. 6, lines 1 - 4, the solvent for the catalyst is purposely chosen to be a hydrophilic liquid because a dissolution of the green film which contains an organic binder can be avoided. Those of skill in the art understand that hydrophilic (= strong affinity for water) and organic substances (commonly lipophilic, oleophilic = strong affinity for lipids, oils) do not mix, with the effect that the adhesion of the catalyst layer is not only not facilitated but it is even purposely reduced.

It follows that the process described by Kanoh would not be suitable to piezoelectric monoliths, because proper rigidity and adhesion of the electrode is of essential importance in the piezoelectric device context.

Neither Kanoh by itself, nor any combination of art, suggests the piezoelectric component according to claim 47, and the other independent claims. Kindly consider the following:

Piezoelectric components - in contrast with multi-layer capacitors and coils - are subjected to relatively strong mechanical stresses. Contractions are triggered every time an electric voltage is applied. These contractions primarily run in the direction of the stack and thus parallel to the electric field. However, there are also contractions which run diagonally to the direction of the stack, particularly at the edges of the electrodes, where the field no longer runs only parallel to the direction of the stack. The electrode layers between the ceramics have a dual purpose, namely, electrical charge transport and also guaranteeing the cohesion of the individual piezoelectric layers, which run the danger of delamination, due to the contraction forces.

We are mindful of the fact that much of the foregoing does not appear in those words in the claims. It is submitted, however, that the claims do indeed deal with a monolithic piezoelectric device (and a corresponding intermediate green product). The foregoing arguments must be judged against the backdrop of these technical requirements. Superior mechanical connection of the electrode layer to the adjoining ceramic sheets is

essential and necessary. These facts are well known to those of skill in the art.

Applicants have found a solution in that the electrode material is applied by classical screen-printing of a copper and binder-containing screen-print paste (see page 16, lines 17 - 23). The binder of the screen-print paste can be united or exchanged with the binder of the green sheet during the laminating of the foil stack, and can thus lead to a particularly close connection between green sheets and electrode layer.

In fact, Kanoh even teaches away from these stability requirements. The method proposed by Kanoh does not lead to a good mechanical connection between the deposited metal layer and the green sheet/ceramic layer that is disposed therebelow. The reference even goes one step further. Not only is there disclosed a method that is inferior in terms of the mechanical stability, but the reference explicitly teaches away from screen-printing the electrodes. As summarized by Kanoh, "more uniform and thinner electro-conductive films can be formed on ceramic green sheets than those formed according to the prior art screen-printing method 1." Col. 2, lines 13 - 16, and col. 1, lines 17 - 29.

Again we note that we are mindful of the fact that the term "screen-printing" does not appear in claim 47. Nevertheless, those of skill in the art will understand that the teaching of Kanoh is not suitable to fulfill the primary requirements of a piezoelectric component. The reference can therefore also not provide a suggestion to one of skill in the art towards an improved piezoelectric device.

Claims 47 and 82, as well as claim 45, however, do not only deal with the formation of a piezoelectric component. The invention defined therein also provides for a superior solution in the context of piezoelectric actuators, namely, their production in the least expensive possible manner, with inexpensive copper used for the inner electrode.

Again, Kanoh requires high-quality precious metals such as palladium, at least for the catalyst (i.e., a major portion of the layer 4/5, 14/15, or 24/25). The prior art reference therefore is also disqualified in that regard.

The teachings of the various secondary references are acknowledged. The secondary references Seo, Tsunooka et al, Dawson et al., and Horikawa are primarily cited as teaching specifics of the ceramic materials (i.e., various perovskites suitable for lower sintering temperatures). These teachings do

not make up for the shortcoming of the primary reference Kanoh, which fails to disclose a monolithic piezoelectric layer stack.

Specific mention is made by the Examiner of the advantage promulgated by Dawson et al., according to which the disclosed materials allow "less expensive materials to be used for the internal electrode materials." Office action, page 6, lines 5-6 (citing Dawson et al., col. 2, lines 63-66). While this may be a correct statement, it is important to point out with regard to Dawson et al. that the reference deals intimately with perovskite ceramics manufacture for electronic components and that the cited text deals specifically with capacitors. There is no specific information to be found in Dawson et al. that would provide for a monolithic piezoelectric layer stack with a copper electrode in between the ceramics layers.

Conclusion:

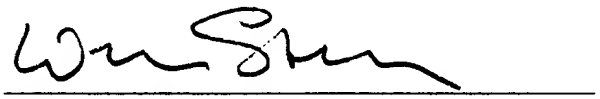
In summary, none of the references, whether taken alone or in any combination, either shows or suggests the features of claim 45, 47, or 82. These claims are, therefore, patentable over the art. Since all of the dependent claims are ultimately dependent thereon, they are patentable as well.

In view of the foregoing, reconsideration and allowance of claims 45 - 82 are solicited.

Petition for extension is herewith made. The extension fee for response within a period of two months pursuant to Section 1.136(a) in the amount of $430.00 in accordance with Section 1.17 is enclosed herewith.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,



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